NOTES ON *SPIGELIA* (LOGANIACEAE)

JAMES HENRICKSON

Department of Biology
California State University
Los Angeles, CA 90032, U.S.A.

ABSTRACT

A treatment is provided for the species of *Spigelia* formerly in the genus *Coelostylis* that lack elongated secund inflorescences. Two taxa are recognized: *Spigelia loganioides* (including *S. texana*), and *S. hedyotidea* (including *S. lindheimeri*, and *S. coulteriana*).

RESUMEN

Se presenta un tratamiento taxonómico para las especies de *Spigelia* anteriormente incluidas en el género *Coelostylis*, o sea las especies sin inflorescencias elongadas y unilaterales. Se reconocen dos taxa: *Spigelia loganioides* (incluyendo *S. texana*), y *S. hedyotidea* (que incluye *S. lindheimeri* y *S. coulteriana*).

INTRODUCTION

This paper deals with the species of *Spigelia* placed by Torrey and Gray in their genus *Coelostylis*, namely *Spigelia loganioides* (Torr. & A.Gray in Endl.) A.DC., of Florida, *Spigelia texana* (Torr. & A.Gray) A.DC., of Texas and *Spigelia lindheimeri* A.Gray of Texas and north central Mexico.

North American *Spigelia* were previously studied by Homer Hurley (1968), but his taxonomic conclusions were never published. This treatment differs from that of Hurley. He intended to accept *S. lindheimeri* as a variety of *S. texana*, and he considered *S. loganioides* synonymous with *S. texana*. However, *S. loganioides* is an older name than *S. texana*, and also *S. lindheimeri* differs from *S. loganioides* and *S. texana* in several characteristics including growth habit, leaf size, leaf placement, vestiture, and corolla throat width that support its recognition at the species level. Studies of the type *S. hedyotidea* show it is referrable to *S. lindheimeri*, and *S. hedyotidea* is older than *S. lindheimeri*; studies of the type of *S. coulteriana*, reveal that it has been misapplied and belongs within the *Coelostylis* group.

TAXONOMY

Spigelia loganioides, *S. texana* and *S. lindheimeri* have been considered by Torrey and Gray (1839, 1841) and Small (1903) to constitute the genus *Coelostylis*. *Coelostylis* was merged into *Spigelia* by A. deCandole (1845) and later accepted as such by Gray (1878). Torrey and Gray's *Coelostylis* differs from the other species of *Spigelia* primarily in the basic structure of the

SIDA 17(1): 89–103. 1996

inflorescence (Fig. 1). Both groups have terminal, highly modified, determinate, dichasial inflorescences and the plants often exhibit a dichotomous branching pattern effected by the presence of terminal inflorescences. In the *Coelostylis* group the upper nodes produce two flowers, a terminal flower on a short, ebracteolate pedicel that is the first to open, and a second flower that develops laterally, opposite a stipule, produced upon a 3-bracted peduncle-pedicel that is longer than pedicel of the first flower (Fig. 1b–d). Each node also produces two shoots from the leaf axils that terminate in a node with two leaves, 2 flowers, and two more lateral shoots in a dichotomous branching pattern that is again repeated. Some plants produce only a single lateral shoot at the upper nodes and exhibit unilateral branching producing leafy monochasia. This pattern is consistent in *Coelostylis* with one exception, a specimen of *S. loganioides* that produced two flowers on the longer stalk, each separated by a three bractlets (*Ginzbarg & Davis 914, TEX*). But the specimen still produced the single terminal, ebracteate flower characteristic of the group.

In the true Spigelias, the inforescences are again terminal and structurally determinate, and bordered by lateral leaves that may produce lateral branches, but they appear as indeterminate, elongated, one-sided spikes or racemes. However, structurally they are determinate, laterally branched, helicoid cymes derived from a dichasia through strong one-sided lateral branching (Fig. 1e–g). The flowers may be sessile or slightly pedicellate along the inflorescence axis, and each flower is subtended by two bracts, one lateral to the flower, the other either above or below the flower on the inflorescence axis (Fig.1e), and the bracts occur on alternate sides in consecutive flowers, which indicates that the inflorescence may actually be a scorpoid cyme.

The inflorescences alone has served to separate the two groups at the generic level, however, some species of *Spigelia* produce flowers that are essentially identical to those of *Coelostilis* and the two groups have been combined within *Spigelia*. *Coelostylis* is not formally recognized as a genus or section or subgenus of *Spigelia* in this paper, as I defer classification to Katherine Gould, who is presently studying the genus at the University of Texas, Austin.

While *Coelostylis* is no longer recognized as a genus, the comprising taxa form a closely related group that share many characteristics. They are perennial herbs with few to several stems arising from underground fibrous root-bearing rootstocks. The roots often have a pink color, and the plants are thus known as pink-root or worm-grass (Godfrey & Wooten 1981). The stems are erect to ascending, sometimes basally decumbent, few to several branched from the base. Flowering stimulates lateral branching often in a dichotomous pattern, but one or three lateral shoots are produced

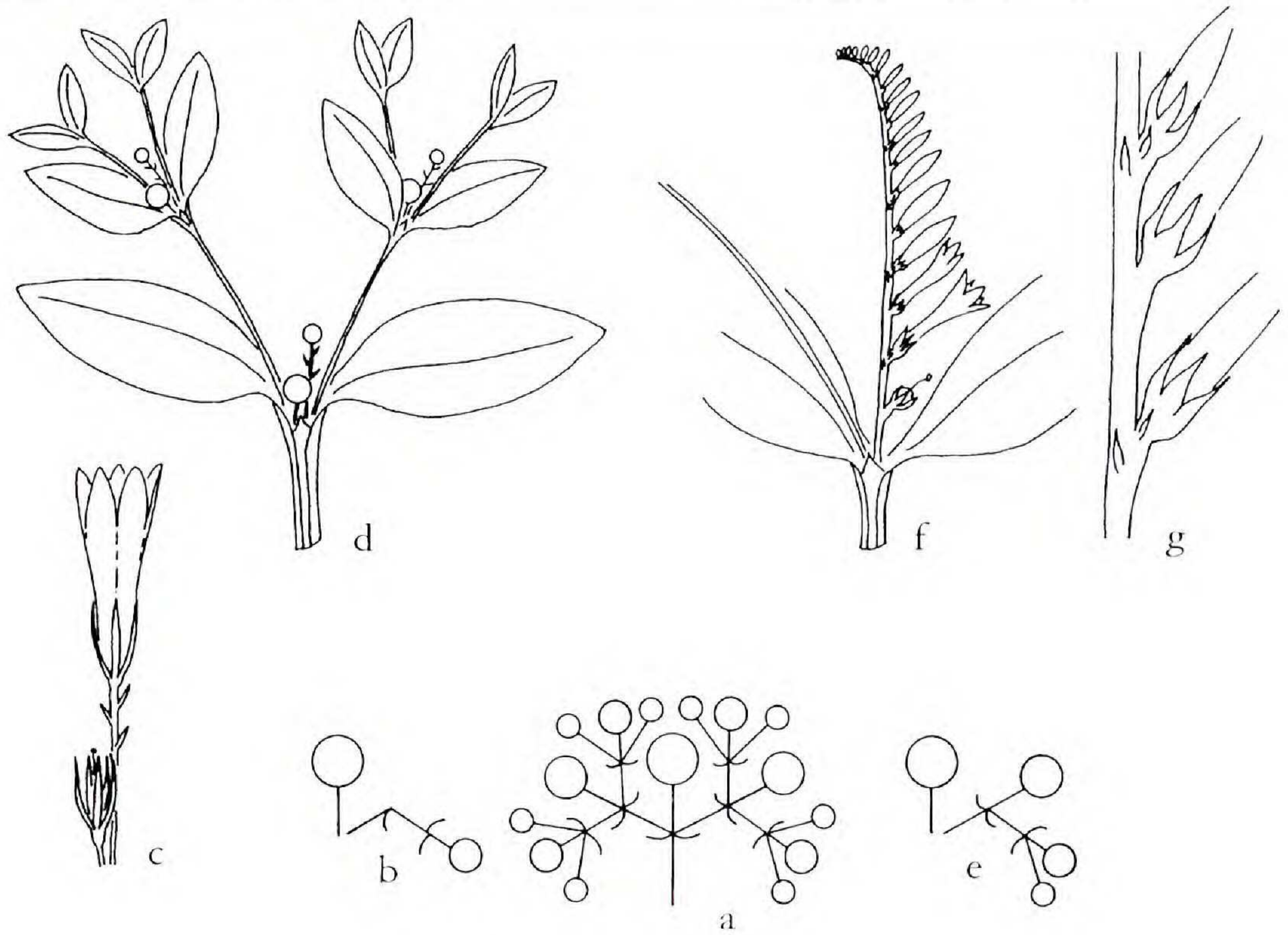

FIG. 1. Comparative diagrams and drawings of the *Coelostylis* and *Spigelia* inflorescences. A. Diagram of dichasium; a determinate inflorescence with opposite lateral branching. B. Diagram of flower clusters in *Coelostylis* group as modified from the basic dichasium structure; retaining one terminal flower on an ebracteolate pedicel, and a lateral flower on a peduncle-pedicel subtended by three bracts. C. Drawing of nodal flower cluster in *Coelostylis*. D. Drawing of inflorescence of *Coelostylis*; each node has one terminal flower, one lateral flower produced opposite a stipule (flowers shown as circles), two shoots produced from the leaf axils that repeat the pattern. E. Diagram of possible origin of inflorescence of *Spigelia* group as modified from the basic dichasial structure. F. Terminal helical cymose inflorescence of *Spigelia humboldtiana* showing one-sided orientation of flowers, continued branching occurs through axial shoots. G. Enlargement of f, showing the presence of two bracts at nodes of inflorescence. The bracts occur on alternate sides of consecutive flowers.

at the flowering nodes. The internodes are shortest near the base, longest medially. The nodes each have two leaves, the margins of which extend as decurrent wings down the subtending internodes, and two, broadly deltate, acute to rounded, whitish, membranous, erect stipules lie between the paired leaf bases. The stems may be glabrous, or more commonly, they have distinct papillae at the nodes, on the stipules, and on the margins of the decurrent wings.

Leaves are opposite, but in *S. loganioides* are often produced in a conspicuous whorl of four large leaves below the inflorescence caused by the supression of an internode. In most plants the lower-stem leaves are more oblong-ovate, oblong-elliptical, sometimes ovate to obovate, more obtuse

to rounded at the tip, and subpetiolate to petiolate. The upper-stem leaves may be similar to the lower leaves in shape or they may be considerably larger, more lanceolate, elliptic to narrowly ovate, acute, sessile, and thinner in texture. The blades are bicolored and range from thin and membranous, to firm and sub-coriaceous; the midvein is impressed above, and the midvein and secondary arcuate veins are raised and sometimes yellowish beneath. The leaf surfaces may be smooth or scabrous with hardened papillae, particularly along the basal margins of the upper surface.

Flowers, as noted above, are terminal at the nodes, with each node producing 2 leaves and 2 flowers, one terminal with an ebracteolate pedicel 0.5–3 mm long, the second produced opposite a stipule with a longer peduncular-pedicellar stalk 5–10(–14) mm long that bears 2–3 subulate bracteoles 1–3(–6.5) mm long. In addition each upper node produces 2 (sometimes 1 or 3) leafy shoots, from the leaf axils, and these shoots again terminate in leaves and flowers.

Calyces are deeply 5 parted, with linear to narrowly lanceolate, acute to obtuse, green, scarious-margined, sometimes papillate-margined sepals. The corollas are salverform to funnelform, thickish, white or tinged or vertically striped with pink or lavender, 10–20 mm long. The tubes are angled to cylindrical, slightly ampliate. The 5 lobes are oblong-ovate, obtuse, valvate, and their margins flare outwards in bud. The stamens are epipetalous, borne in the mid or distal corolla tubes, with free filaments only 1–1.5 mm long; the linear, sagittate, introrse anthers surround the style. The styles are included to slightly exserted, cylindrical and is densely pilose-setose medially—the hairs serve to remove the conspicuous yellow pollen from the anthers as the style elongates. The stigmas are capitate, slightly 2-lipped, and the terminal 70 percent of the style is deciduous leaving a hardened style base tipped with a crown-like structure on the fruit.

Fruit consist of 2 (rarely 3) indurate, sclerified, obovoid to nearly spheroid, yellowish cocci fused for 70–80 percent of their common surface. The outer surface may be initially papillate, but later is smooth and marked with stronger yellow veins. The fruit cocci dehisce along the common vertical septum with the two halves springing opening and falling from the subtending nectary disk. The basal disk is spongy but strongly indurated, plate-like, stramineous, oblong-ellpitical in outline and obtuse at each end as seen from above. Each cocci contains 6, (rarely 10–12) seeds that develop around a central placenta. The seeds are obpyramidal, with the outer surface uneven, spongy-pitted; the interior 3 surfaces are more coarsely tuberculate-ridged. The inner-most point has a prominent hollow pit marking the point of vascular attachment.

The *Coelostylis* and *Spigelia* taxa and the two taxa comprising taxa *Coelostylis* can be distinguished by the following key:

A. Flowers 2 per node, the first-to-flower terminal with an ebracteolate pedicel 1–3 mm long, the lateral flower with a three-bracteate peduncle-pedicel 5–14 mm long; the flowering nodes producing (1–)2(–3) lateral leafy shoots that repeat the pattern. ..... **The Coelostylis group**
  B. Plants 1.5–3.5 dm tall with 1-few stems from the base, the mid-stem leaves mostly oblong-lanceolate, 3–6 cm long, (sometimes smaller and more ovate in Florida) drying thin membranous, the plants usually with a whorl of 4 leaves subtending the inflorescence; the internode wings papillate only for a short distance below the node; corollas broadly ampliate, 4–5 mm wide below the lobes; plants of west-central Florida and east-central Texas. ..... **Spigelia loganioides**
  B. Plants 0.5–1.2(–2) dm tall, usually bushy with many stems from the base; the mid-stem leaves mostly narrowly lanceolate (sometimes more ovate), 1.2–3(–3.5) cm long, typically rather thick with the upper surface variously papillate and wrinkled in dried specimens; the plants rarely forming a whorl of 4 leaves below the inflorescence; the internode papillate all along the internode wings and also on the internode between the wings; corollas narrowly ampliate, 2–3.5 mm wide below the lobes; plants of east-central Texas, north-central Mexico. ..... **Spigelia hedyotidea**
A. Flowers produced in terminal, elongated, one-sided, spike-like or raceme-like inflorescences, the inflorescences actually of determinate helicoid cymes with indeterminate, unilateral branching. ..... **The true Spigelias**

Spigelia loganioides (Torr. & A.Gray in Endl.) A.DC., Prod. 9:4. 1845.

Coelostylis loganioides Torr. & A.Gray in Endl. Nov. stirp. dec. (5):33, 1839; Iconogr. gen. pl. (9):t. 101, 1841 (illust.). TYPE: U.S.A. FLORIDA. Marion Co.: Prope Fort King, *Burrows & Alden s.n.* (HOLOTYPE: NY!, ISOTYPE: NY!).

Spigelia texana (Torr. & A.Gray) A.DC., Prod. 9:5. 1845. *Coelostylis texana* Torr. & Gray Fl. N. Amer. 2(1):44. 1841. TYPE: U.S.A. TEXAS: (exsiccata fascicle III) *Drummond 321* (HOLOTYPE: NY!; ISOTYPES: G!, GH!, GH!)

Erect, 1-few stemmed herbs (10–)20–30(–50) cm tall; internodes (1–)2–6(–8.5) cm long, glabrous except where papillate along the margins of the distal-most decurrent internode wings, on the stipules, and on the lower leaf margins. Leaves opposite, usually in a whorl of four below the inflorescences; basal-stem leaf blades often ovate, oblong-ovate, to 2 cm long, acute to rounded at the tip, tapered to a winged petiole at the base, the mid- and upper-stem leaf blades narrowly ovate, lanceolate, oblong-elliptical, elliptical to rhombic, (1.4–)3–6.5 cm long, (0.5–)1–1.7(–2.2) cm wide, acute, obtuse, mostly minutely apiculate at tip, the bases cuneate, sessile or tapering to a winged petiole-like base to 3 mm long, the margins entire, often revolute or enrolled when dry, fleshy, the blades drying thin membranous, glabrous except where sometimes scabrously papillate along the upper-surface margins above the petiole, glabrous, slightly more glaucous beneath. Terminal-flower pedicel 1–1.5(–2.5) mm long, ebracteolate; lateral-flower peduncle-pedicel 4–7(–14) mm long, with subulate bractlets 1–4.5 mm long, 0.2–0.4 mm wide; sepals linear-lanceolate, (2.5–)3.5–5.5

mm long (slightly accrescent in fruit), 0.4–1 mm wide at base, acute, glabrous or weakly scabrous along the margins; corollas white throughout or with vertical, pale-lavender lines extending up the tubes and bordering the lobes, funnelform, 12–14.5(–20.5) mm long, the tubes ampliate, 8–9(–15) mm long, to 4–5 mm wide at the throat (pressed), the lobes oblong-ovate, spreading, 3.5–5.5 mm long, 2.2–3.5 mm wide, acute, entire, thickish; stamens borne in the mid-corolla tubes; filaments 1–1.5 mm long; anthers 1.1–1.3 mm long; styles 6–7.5 mm long, included, the stigma borne in the distal tube, the persistent style base 1.7–2.3 mm long. Fruit cocci 2, nearly spheroidal, slightly divergent, glabrous, the pair 3–4.5 mm high, 5–5.5 mm wide, the subtending thickened disk (3.2–)4–5 mm long; seeds 6–12 per cocci, 1.5–1.8 mm long, 1.3–1.5 mm wide. (Figs. 2, 3a–c, 4).

As recognized here *Spigelia loganioides* occurs in both Florida and Texas. It is distinguished from S. *hedyotidea* by: (1) its taller growth habit; (2) its larger, usually more membranous leaves; (3) a tendency to be glabrous throughout except at the nodes where stiff papillae usually occur on the basal portion of the upper leaf margins and continue down the petiole and the distal portion of the decurrent internode wings, and on the margin and outer surface of the stipules; (4) its tendency to produce a whorl of four leaves below the leafy inflorescences, and; (5) the slightly longer, more conspicuously ampliate corollas. Specimens in Texas generally conform well to these features as do most specimens from Florida, however, some Floridian collections, including the type of *S. loganioides*, differ vegetatively.

While the type locality was designated in the original description as being near Tampa Bay, the type collection actually is from near Fort King in Marion County (Fort King now lies within the City of Ocala, Florida). Plants from this region differ from those of most other localities in having small, mostly broadly ovate, sometimes lanceolate, obtuse to acute-tipped, opposite leaves that do not form a whorl below the inflorescence; the plants are also relatively short in stature (Fig. 2a). The type collection, was made by Burrows and Alden near Fort King, (E. Silas Burrows was an army physician stationed for time at Fort King during the second Seminole War—1835–1842, Wunderlin pers. comm.) and the type specimen, illustrated in Endlicher (1841), is redrawn here as Fig. 2a. It consists of a curved stem 25 cm long, with ovate to broadly ovate, obtuse-tipped leaves 14–20 mm long and 6–8 mm wide in the distal 10 cm of the stem. The leaves are all opposite and do not form whorls below the flowers.

A second old collection from the type region, [in pinetis, prope Fort King, Florida, Jul 1848, *F. Rugel 327*, (GH-2 sheets, NY, FLAS)] also consists of moderately short plants 1–2 dm tall. Most (21) of the 24 stems present on these four sheets have ovate, sometimes broadly ovate, obtuse-tipped leaves similar to those present on the Burrows and Alden collection

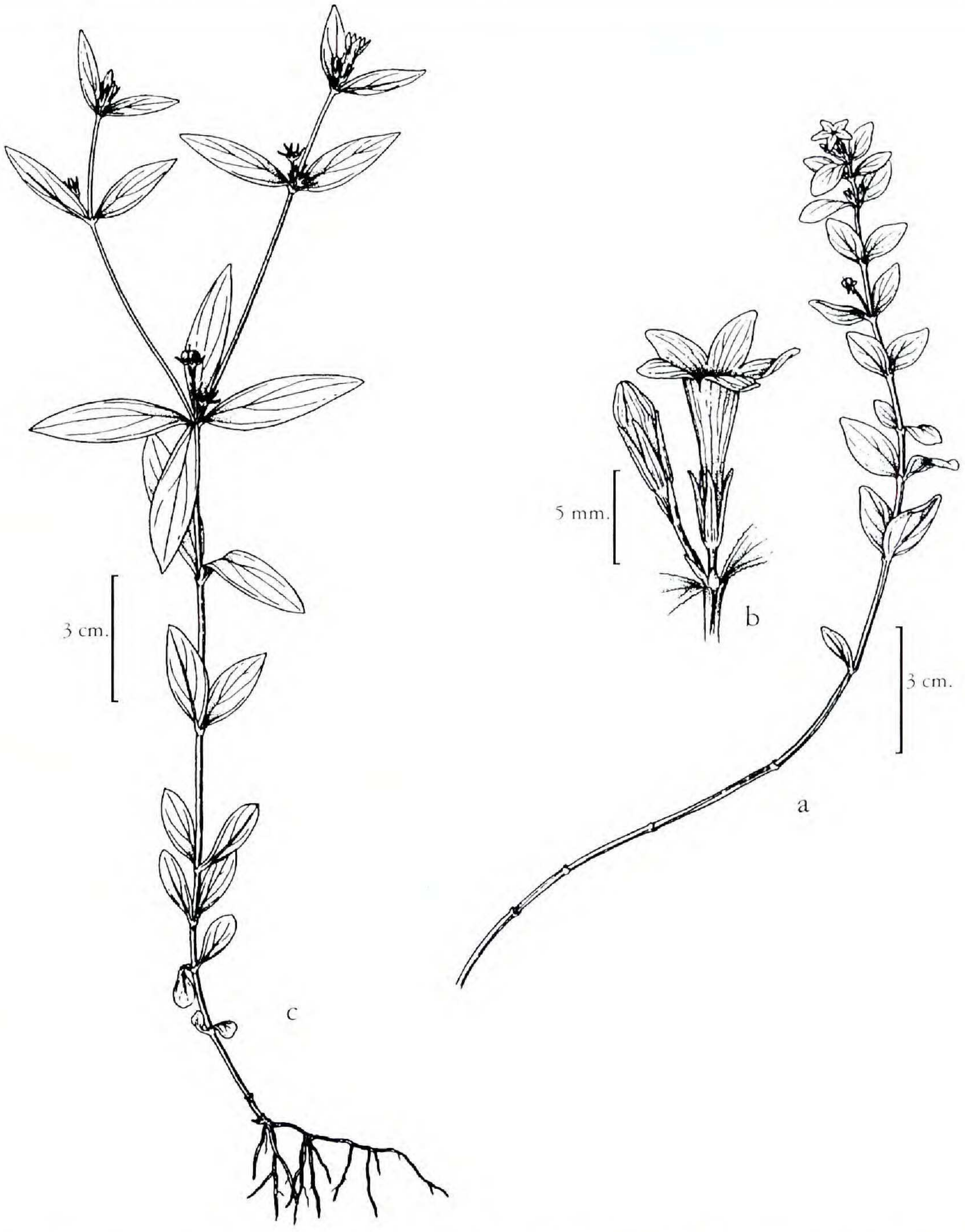

FIG. 2. Variation in *Spigelia loganioides* in Florida. A–B. From the Fort King population in Marion Co., Florida, showing plants with more ovate, shorter leaves and both axillary and terminal flowers (Redrawn from the figure in Endlicher (1840) from the Burrows and Alden holotype). C. Typical specimen from Levy Co., Florida, showing obovate to ovate basal leaves and characteristic quartet of larger elliptical leaves and characteristic branching pattern. These plants are identical to plants from eastern Texas [From *Wood, Wilson & Cooley 9169* (A)]. Magnifications as indicated.

with mid-stem leaves measuring 14–23 mm long, 9–11 mm wide. However, one GH and the NY sheet contain stems with larger, thinner, more elliptical, acute-tipped, mid-stem leaves, 22–25 mm long, 7–10 mm wide; these elliptical leaves are similar to those occurring in other specimens in western Florida. Other collections from the Ocala region (*Small, Mosier & DeWinkeler 10810*) and from Levy County (*Holland & Mears s.n., Murril s.n., Garber s.n.*) are also small, to 2.5 dm tall, but have all opposite, more lanceolate to elliptical, acute leaves 2–3.5 cm. Still other collections (*Woods, Wilson & Cooley 9169, Curtis s.n.*) are taller, have ovate, obtuse- round-tipped leaves at the base, but more lanceolate leaves above and the leaves subtending the inflorescences may or may not form a single whorl of 4 leaves—this character varying from plant to plant. Through these and other specimens one sees that there is continuum from small plants with all ovate, obtuse-tipped, opposite leaves, to plants that have smaller, broadly ovate, obtuse-tipped leaves at the lower nodes, and larger more lanceolate, acute-tipped leaves at the mid and upper nodes that are all opposite in some specimens but form single whorls of leaves below the inflorescences in others. Still other plants have large lanceolate, elliptical-lanceolate leaves and well developed whorls of leaves below the inflorescences. All these plants have similar inflorescences and flowers.

The small, broadly ovate, obtuse-tipped leaves characteristic of the type collection (Fig. 2a) initially stand in strong contrast to the larger, elliptic, acute-tipped leaves found on other spigelias in Florida (Fig. 2c). However, the larger plants with lanceolate, acute-tipped leaves that form a whorl of leaves below the inflorescence typically produce short-ovate leaves on the lower stems, although sometimes they will have fallen from the plants by the time of flowering. It seems reasonable to consider the shorter, blunt-tipped leaves as characteristic juvenile foliage of the species. In the collections from the type locality, it appears that flowering occurs on specimens with only juvenile foliage. This can be considered a form of paedomorphosis, i.e. the retention of juvenile characteristics on mature plants. The tendency to flower while having only juvenile leaves is probably fixed genetically. There is also the possibility that if the plant develops late in the season and flowering triggered earlier, the plants may have only produced the shorter, basal leaves by the time of flowering.

In this study, both the ovate-leaved and elliptical-leaved specimens are considered to be the same taxon. One could argue that ovate-leaved and elliptical-leaved specimens represented distinct taxa, but this would not be supported by the presence of plants with both leaf types and the overall continuum of variation from the extreme, represented by the type specimen (Fig. 2a), and other larger specimens from Florida (Fig. 2c) as well as Texas (Fig. 3a).

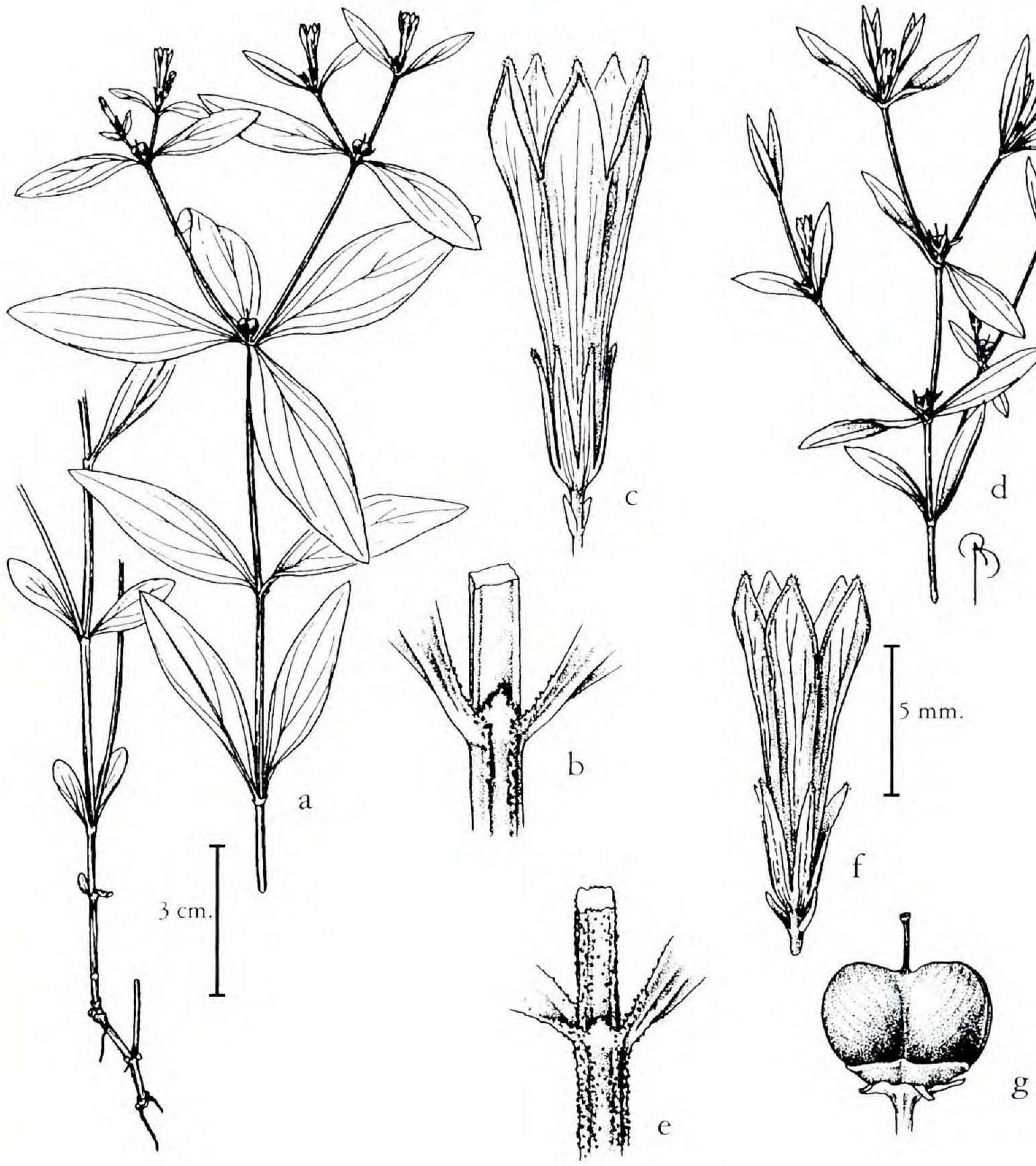

FIG. 3. *Spigelia loganioides* and *S. hedyotidea* from Texas and Mexico. A–C. *S. loganioides* from Texas. A. Stem showing paired large cauline leaves, quartet of leaves subtending first flower of dichasia, leaves, fruits, and flowers in upper branches of dichasia. B. Node showing deltate stipule, leaf bases, and distinct decurrent ridges extending down glabrous internodes (A–B from *Killip 43289*, TEX). C. Flower showing bractlets, calyx and corolla (*Correll & Johnston 17503*, LL). D–G. *S. hedyotidea* from Texas. D. Stem showing smaller opposite leaves, dichotomously branched inflorescences, flowers, and fruit. E. Node showing deltate stipule, leaf bases, and decurrently ridged internodes with distinctive scabrous papillae on ridges and lower leaf margins (D–E from *Smith 507*, TEX). F. Open flower showing bractlets, calyx, corolla; note broader sepals. g. Fruit showing paired cocci, remnants of calyx and nectary at base and persisting style base at fruit tip (F–G from *Correll, Rollins & Chambers 16055*, LL). Magnifications as indicated, scale with A holds for all stems; scale with F holds for all flowers and fruit.

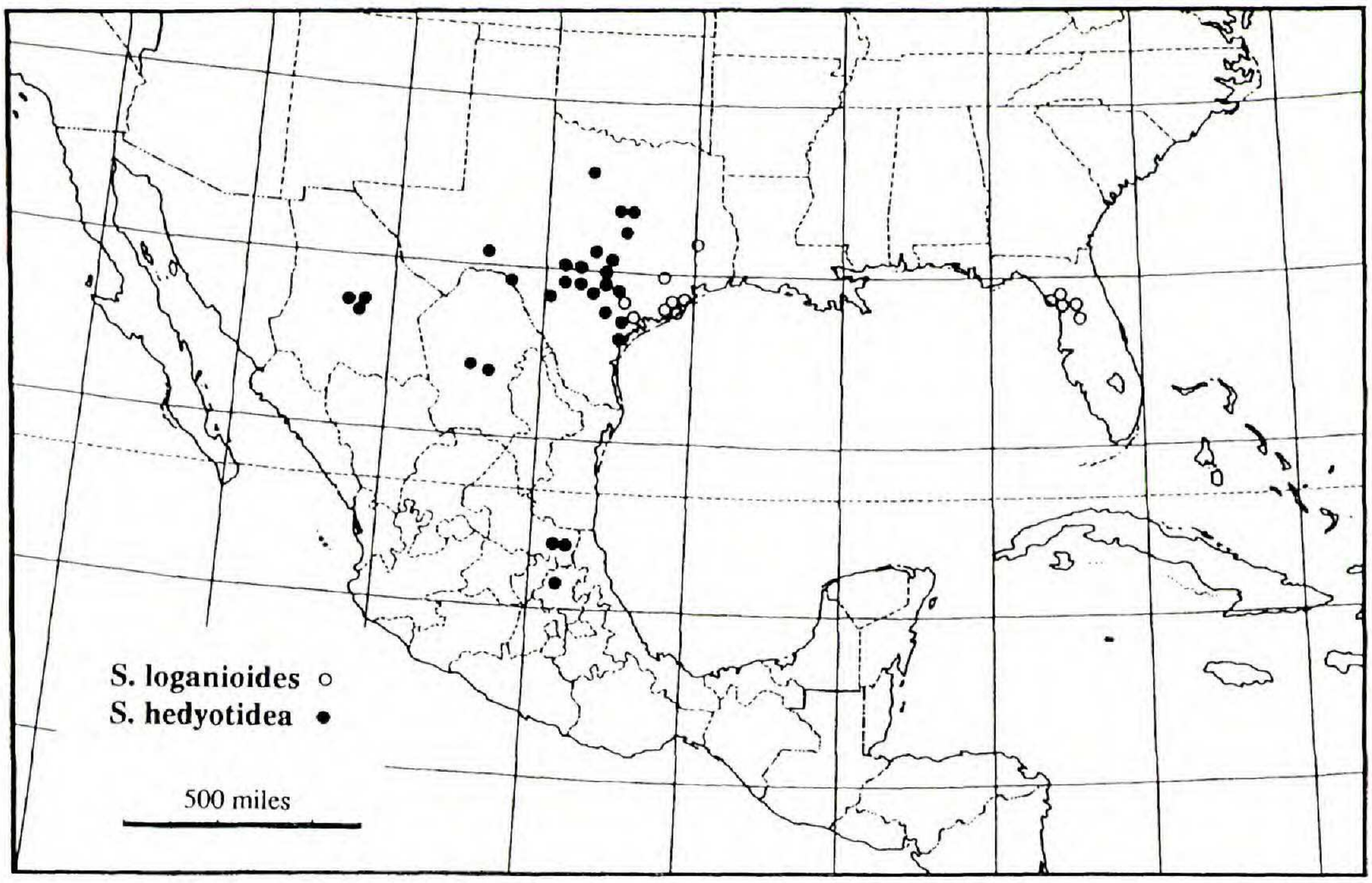

FIG. 4. Documented distribution of *Spigelia loganioides* in Florida and Texas and *S. hedyotidea* in Texas and Mexico.

The plants from Texas known as *Spigelia texana* are identical to those of Florida and are considered conspecific with the older *S. loganioides*. The Texas specimens are more consistently larger with a quartet of leaves below the inflorescences.

The species has a disjunct distribution (Fig. 4); it is known from limestone areas in Levy, Marion and Sumter counties in west-central Florida where it occurs in wet woodlands, hydric hammocks, and floodplain swamps. It also occurs in Brazoria, Colorado, De Witt, Gonzales, Matagorda, Polk, Victoria, Waller and Washington counties in eastern Texas in black-clay soils, thickets, woods along creeks, and riparian forests. Soils in both of these areas are largely derived from limestone and chalk parent material. The taxon does not occur in the broad region between Florida and Texas as limestone-chalky parent material is not present in this region. There are a number of other taxa that have similar disjunct Florida-Texas distributions including *Dyschoriste*, *Cladium*, and *Samolus*.

Representative specimens: U.S.A. FLORIDA. **Levy Co.:** ca 1 mi SW of Gulf Hammock, T14S, R16E, sec. 29, 3 May 1959, *Wood, Wilson & Cooley 9169* (A); Gulf Hammock, 9 May 1941, *Murrill s.n.* (FLAS); Gulf Hammock, just W of Griffin Creek, T15S, R14E, sec. 8 & 17, 22 May 1980, *Judd et al. 2660* (FLAS); 6 mi W of Otter Creek, S of Hwy 24, 5 Jul 1979, *Dunevitz 29* (FLAS); 6 mi W of Otter Creek, between Otter Creek and Rosewood, 29 May 1976, *Godfrey 76520* (GH, NY, FLAS-photo); Rosewood, Jun 1876, *Garber s.n.* (FLAS, NY-2, US-2); C.R. 326 at Wekiva Run, E of US 19, 16 Jul 1989, *Holland & Mears s.n.* (USF). **Marion Co.:** Oklawaha River, E of Ocala, 10 Apr 1923, *Small, Mosier & DeWinkeler 10810* (FLAS, GH, NY, US). **Sumter Co.:** near Sumterville, Jun, *Curtiss 2258*

(GH, NY-2, US). TEXAS. **Brazoria Co.**: woods along Cedar Lake Creek, San Bernard Natl. Wildlife Ref., 8 May 1970, *Fleetwood 9753* (TEX); Crowell Ranch, 31 May 1970, *Fleetwood 9789* (TEX); Lake Jackson, woods along Oyster Creek, 2 May 1953, *Killip 43289* (SMU, TEX). **Colorado Co.**: Columbia, 5 Oct 1900, *Bush 1288* (NY, US). **De Witt Co.**: 7 mi SE of Cuero, 6 Jul 1957, *Correll & Johnston 17503* (LL, TEX). **Gonzales Co.**: Ottine Swamp, 8 Aug 1935, *Parks 14603* (GH); 4 mi ESE of RR 532 near US 90A, Kokernot Ranch on Peach Creek, 12 May 1991, *Ginsbarg 941* (TEX). **Polk Co.**: Menard Creek, near Trinity, 28 Apr 1981, *Watson 3250* (SMU). **Victoria Co.**: Guadalupe River bottom, 29 May 1932, *Tharp s.n.* (TEX). **Waller Co.**: along Brazos River, Stephan F. Austin State Park, near Sealy, 25 May 1957, *Correll 16444* (LL). **Washington Co.**: Burton, 26 May 1872, *Hall 288* (NY-3, US).

Spigelia hedyotidea A.DC., Prod. 9:7. 1845. TYPE: MÉXICO: without location, date, *Sessé & Mociño, plate No. 813* (HOLOTYPE: illustration 813 (deCandole's number) at G (microfische!), photo of holotype F!, US! Described by A. deCandole from a copy of a Sessé and Mociño drawing, which remains at G, with photographs at F and US. No original drawing is present at the Hunt Institute for Botanical Documentation (Kiger, pers. comm.; see Kiger 1981; McVaugh 1982). Two fragments of authentic Sessé and Mociño material labeled *Spigelia axillaris* n., No. 58 and No. 392 were found in F, these fragments were presumably removed from specimens borrowed from MA (McVaugh 1977, 1980). The "axillaris" combination was not published in either *Flora Nuevo Hispanica* (1878–1891) or the *Flora Mexicana* (1891–1897). These specimens exactly agree with the illustration upon which *S. hedyotidea* is based and are comparable to *S. lindheimeri* A. Gray; their source from México is discussed below.

Spigelia lindheimeri A.Gray, Syn. fl. N. Amer. 2(1):108. 1878. *Coelostylis lindheimeri* (A.Gray) Small. Fl. s.e. U.S. 922. 1903. TYPE: U.S.A. TEXAS. Comal Co.: New Braunfels, rarely on black silt soil, damp prairies, Jun 1846, *F. Lindheimer 172* (LECTOTYPE, here designated, GH!). Gray's (1878) citation of the locality as "Prairies of W. Texas, Lindheimer, Wright" made available many annotated syntypes at GH; the designated lectotype has an attached note from Lindheimer stating "distinct from *S. texana*?, fls. apparently half as large." The specimen has narrow to broad, relatively large lanceolate leaves, mature fruit, and seeds.

Spigelia coulteriana Benth., J. Linn. Soc., Bot. 1:90. 1857. TYPE: MÉXICO. HIDALGO: Zimapán, *Coulter 962*. (HOLOTYPE: K!, photo of holotype: NY!). Long considered a species having pseudospicate inflorescences, close examination of the type reveals that the nodes have 2 flowers and belong within *Coelostylis*.

Multistemmed, often decumbent, bushy herbs 5–15(–19) cm tall; stems usually scabrous with erect, stiff, papillae 0.05–0.07 mm long throughout the decurrent internodal wings and usually on the internode surfaces between the wings, on the stipules and upper leaf surfaces or margins; internodes (0.6–)1.5–3.5 cm long. Leaves all opposite, very rarely in whorls of 4 below the inflorescence, the lowermost leaves usually ovate, obtuse to rounded at the tips, to 15 mm long, petiolate, the lower mid stem leaves often oblanceolate, obtuse, the mid- and upper-stem leaf blades lanceolate, narrowly lanceolate, lance-elliptic, (1.2–)1.5–3(–3.5) cm long, 0.3–1(–1.3) cm wide, acute, apiculate at the tip, (sometimes all leaves oblong-ovate,

and blunt tipped) the blades narrowly cuneate, tapering to short petiole-like base 1–3(–4.5) mm long, the margins entire to undulate, often revolute or enrolled when dry, the blades often stiff and coriaceous, the upper surface strongly punctate with cystoliths and with stiff-walled papillae particularly along the margins, typically appearing wrinkled when dried, the lower surface glabrous, gray-green (in shaded plants the leaves often more membranous). Flowers produced in terminal, leafy dichasia with two flowers per node, the shorter flower with an ebracteolate pedicel 1–3 mm long, the taller lateral flower with a bracteate peduncle-pedicel 6–10(–14) mm long, the bractlets subulate-linear, 2.5–7 mm long, 0.4–0.6 mm wide; sepals linear, linear-lanceolate, 3.4–8.5 mm long, 0.5–1(–1.5) mm wide at base, acute at tip, often scabrously papillate along the margins and sometimes along the midveins; corollas white, suffused or lined with pink externally, funnelform, 10–13.5 mm long, the tubes cylindrical to slightly ampliate, (5–)7–9 mm long, to 2–3.5 mm wide at the throat, the lobes obliquely oblong-lanceolate, 3–4.8 mm long, 1.5–1.9 mm wide; stamens borne in the mid-upper corolla tube, the filaments 0.9–1.2 mm long, the anthers 1.0–1.2 mm long; styles 6–7 mm long, the persisting style base 1.2–2 mm long. Fruit cocci 2, nearly spheroid, very slightly divergent, glabrous, the pair 2.5–3.7 mm high, 5–6 mm wide; subtending thickened disk 3.2–3.5 mm wide, 3.5–5 mm long; seeds 6–7 per cocci, 1.5–2 mm long, 1.2–1.6 mm wide (Figs. 3d–g, 4).

Spigelia hedyotidea can be distinguished from *S. loganioides* in that *S. hedyotidea* has: (1) a smaller, bushy growth habit with many stems developing from the basal rootstock; (2) a much smaller, mostly narrowly lanceolate, often thicker leaves that are usually papillate and rather strongly wrinkled on the upper blade surface when dry; (3) a more strongly papillate epidermis with papillae occurring throughout the internode wings (not just below the nodes), and usually over much of the internode surfaces, on the upper-leaf surfaces and stipules; (4) consistent opposite leaves; it only rarely forms a whorl of four leaves below the inflorescences; and (5) narrower, less ampliate corolla tubes.

However, *S. hedyotidea* is quite variable and there many exceptions to the above-noted characteristics. While open-grown plants typically are short and bushy with rather firm, coriaceous leaves, plants collected in shady habitats tend to have longer internodes, less coriaceous, and often larger leaves that may press flat and appear quite smooth and membranous in specimens. Some specimens have short, broadly ovate, more strongly petiolate leaves throughout the stem (reminescent of the condition in Florida with the type of *S. loganioides*). The plants from San Luis Potosí and Hidalgo, and some from Texas, are quite glabrous with papillae occurring only along

the lower margins of the leaves, on the stipules, but they typically occur all along the internode wings.

The small, more glabrous specimens from San Luis Potosí appear very much like specimens of *S. coulteriana*, a species long considered to range from Hidalgo to Guatalmala (Gibson, 1969). However, the specimens from southern Mexico and Central America have elongate pseudospicate inflorescences characteristic of the true Spigelias. Careful examination of the type of *S. coulteriana* from Zimapán, Hidalgo, revealed an inflorescence type characteristic of the *Coelostylis* group and thus *S. coulteriana* is here considered synonyous with *S. hedyotidea*. While most specimens of *S. hedyotidea* are strongly papillate, the type of *S. coulteriana* is very weakly papillate. It is not possible to use this characteristic to recognize two taxa here as many other Mexican collections are also weakly papillate, as are some collections from Texas.

The oldest name for this taxon turns out to be *Spigelia hedoyotidea* A.DC described in the Prodromus in 1845 from a drawing from Sessé and Mociño in possession of deCandole. The holotype of the taxon remains the drawing of the species at G. Original Sessé and Mociño herbarium collections of this taxon presumably exist at MA, and fragments at F. The collected specimens are very similar to the type specimens of *S. lindheimeri*. It is not known exactly where the collected material was obtained for neither Sessé or Mociño visited areas where this species grows (McVaugh 1977). McVaugh (1977, p. 110), however, notes that at least two other Sessé and Mociño species were obtained from the Texano-Mexican frontier region from Ignacio León, a pharmacist, who sent seeds and plants to Sessé from his station in Valle de Santa Rosa, (Santa Rosa de Múzquiz) now known as Múzquiz, Coahuila. This is well within the range of the taxon and probably is the source of the material in the Sessé and Mociño herbarium and the source of the illustration, a copy of which was used by deCandolle in his original description.

The taxon is known from open gravelly, sandy clay loams, dark-soiled praires, limestone slopes, limestone bluffs on generally dry soils in chaparral thickets, mesquite thickets, mixed desert scrub, shaded woodlands, river banks, and rocky creek beds, from central Texas to Chihuahua and Coahuila, San Luis Potosí and northern Hidalgo in México. Specimen data indicates that the flowers are closed in the morning (*McVaugh 8342*) and open in the afternoon (*Jones 537*).

Representative specimens: U.S.A. TEXAS. **Bandera Co.**: Hill Country State Natural Area, 29°38'48"N, 99°12'45"W, 4 May 1995, *Carr 14586* (TEX). **Bell Co.**: near Little River, 13 May 1930, *Wolf 2110* (US). **Bexar Co.**: mesquite thickets, San Antonio, Apr 1884, *Havard 13* (GH). **Comal Co.**: New Braunfels, May–Jun 1847, *Lindheimer 43* (GH). **Guadalupe Co.**: Seguin, 28 Apr 1942, *Parks 39529* (TEX). **Hayes Co.**: San Marcos, 1 Jun

1917, *Palmer 12122* (NY, US). **Karnes Co.:** 5.5 mi SW of Karnes City, 19 Apr 1957, *Correll, Rollins & Chambers 16055* (LL). **Kendall Co.:** shady woodland below Edge Falls, 3 May 1947, *Tharp, Mericle, & Barkley 17T139* (GH, TEX). **Kerr Co.:** Kerrville, 7–14 May 1894, *Heller 1719* (NY, US). **McLennan Co.:** Middle Bosque, 1st crossing, north bank, 2 May 1947, *Smith 507* (TEX). **Palo Pinto Co.:** hills above Possom Kingdom State Park, 17 May 1947, *McVaugh 8342* (SMU, TEX). **San Patricio Co.:** 7.5 mi S of Taft, 29 May 1951, *Jones 537* (SMU). **Terrell Co.:** Creek bed, Independence Creek, 1 mi above its junction with Pecos River, 22 Jun 1949, *Webster 392* (TEX). **Tom Greene Co?:** Middle fork of Rio Concho, Apr 1886, *Reverchon s.n.* (GH). **Travis Co.:** Austin, 9 May 1936, *Tharp s.n.* (TEX-2). **Uvalde Co.:** Uvalde, 11 May 1918, *Palmer 13565* (US). **Val Verde Co.:** bank of Devil's River at Fawcett Lodge, 20–30 mi up river, 3 Apr 1953, *Warnock 11345* (LL, SMU).

MEXICO. Chihuahua: Santa Eulaia (sic.) Mts., 1 May–6 Jun 1885, *Pringle 25* (GH); Sierra del Roque, NNE of Julimes above Mina Las Playas, 28°39-40'N, 105°18-19'W, 19 Jun 1973, *Johnston, Wendt, & Chiang 11389A* (LL). **Coahuila:** Sierra de la Madera, Cañón de la Madera, 1890 m, 27°07'N, 102°37'W, 29 May 1975, *Wendt & Lott 842A* (LL); Sierra de la Gloria, Cañón El Cono, a side canyon of Cañón Chilpitin, 1160 m, 26°49'N, 101°17'W, 6 Sep 1976, *Wendt & Riskind 1654* (TEX). **San Luis Potosí:** San Dieguito, 13–16 Jun 1904, *Palmer 86* (NY, US-2); Mcpio. Valles, Río Valles at El Banito, 7 mi S. Valles, 26 Jun 1940, *Leavenworth 183* (F).

ACKNOWLEDGMENTS

I thank Richard Hilsenbeck (Florida Nature Conservancy), Richard Wunderlin (USF), and Laurence Dorr (US) for information concerning Florida populations of *Spigelia loganioides* and historical collectors, Robert Kiger (Hunt Institute for Botanical Documentation) for searching through the Sessé and Mociño collections for original illustration of *Spigelia hedyotidea*, Katherine Gould (TEX), who is now monographing *Spigelia*, for comments on the manuscript, Bobbi Angell (NY) for the plant illustrations, Roberta Wilson (TEX) for the inflorescence illustrations, Thomas Wendt (LSU) for the Spanish translation of the abstract, and A, FLAS, GH, NY, SMU, TEX-LL, US for specimen loans, and the Plant Resources Center at the University of Texas, Austin for use of facilities.

REFERENCES

DE CANDOLE, A. 1845. Ordo CXXXI, Loganiaceae. Prodromus systematis naturalis regni vegetabilis. 9:1–37.

ENDLICHER, S.L. 1841. Iconographia generum plantarum. (9): t. 101.

GRAY, A. 1878. Order LXXXIX. Loganiaceae. Synoptical flora of North America 2(1):106–110.

GODFREY, R.K. and J.W. WOOTEN. 1981. Aquatic and wetland plants of southeastern United States. University of Georgia Press, Athens.

HURLEY, H. 1968. A taxonomic revision of the genus *Spigelia* (Loganaceae). unpubl. dissert., George Washington University, Washington, DC.

KIGER, R.W. 1981. Long-lost drawings from Sessé and Mociño expedition acquired by Hunt Institute. Syst. Bot. 6:189–190.

MCVAUGH, R. 1977. Botanical result of the Sessè and Mociño expedition (1787–1803). I. Summary of excursions and travels. Contr. Univ. Michigan Herb. 11:97–195.

McVAUGH, R. 1980. Botanical result of the Sessè and Mociño expedition (1787–1803). II. The icones florae Mexicanae. Contr. Univ. Michigan Herb. 14:99–140.

McVAUGH, R. 1982. The lost paintings of the Sessé & Mociño expedition: a newly available resource. Taxon 31:619–692.

TORREY, J. and A. GRAY. 1839. In: S.L. Endlicher. Novarum stirpium decades 5:33–34.

TORREY, J. and A. GRAY. 1841. Suborder III. Loganieae R. Br. Flora of North America 2(1):43–46.

WUNDERLIN, R.P. 1982. Guide to the vascular plants of Central Florida, University Presses of Florida, Tampa.

SMALL, J.K. 1903. Flora of the southeastern United States. Privately published. New York.